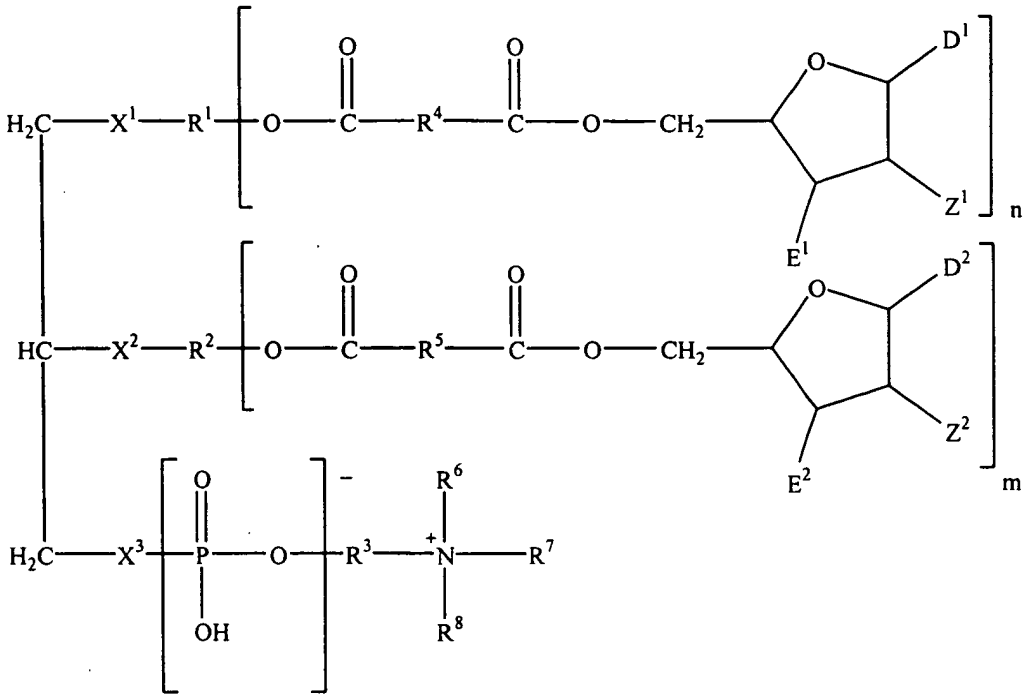
CLAIMS

What is claimed is:

1. A compound having the structure of Formula I:



wherein,

n and m are each independently 0 or 1, but n and m are not both 0;

R^1 is (C_1-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl if n is 0 and (C_1-C_{16}) alkylene, branched alkyl, alkenyl or alkynyl if n is 1;

R^2 is (C_1-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl if m is 0 and (C_1-C_{16}) alkylene, branched alkyl, alkenyl or alkynyl if m is 1;

R^3, R^4 and R^5 are each independently (C_1-C_8) alkylene;

R^6, R^7 and R^8 are each independently (C_1-C_8) alkyl;

X^1 and X^2 are each independently S, O, NHC=O, OC=O or NH;

X^3 is O or S;

E^1 is H, S, halo or N_3;

Z^1 is H, S, or halo; or E^1 and Z^1 together are a covalent bond;

E^2 is H, S, halo, or N_3;

Z^2 is H, S, or halo; or E^2 and Z^2 together are a covalent bond;

D^1 and D^2 are each independently selected from the group consisting of purine, pyrimidine, adenine, thymine, cytosine, guanine, hypoxanthine, inosine, uracil and ring modifications thereof, including O, N, and S substitutions, and

wherein, each alkyl, alkylene, branched alkyl, alkenyl, alkynyl, adenine, thymine, cytosine, guanine, pyrimidine, purine, hypoxanthine, inosine and uracil of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, D^1, and D^2 can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, $(C_1$-$C_8)$ alkyl, $(C_1$-$C_8)$ alkoxy, aryl, and $N(R^a)(R^b)$ wherein R^a and R^b are each independently selected from the group consisting of H and $(C_1$-$C_8)$ alkyl.

2. The compound of claim 1, wherein said compound is present in an amount effective to inhibit virus replication in a mammal.

3. The compound of claim 1, wherein R^1 is $(C_6$-$C_{16})$ alkyl if n is 0 or -CH=CH- if n is 1.

4. The compound of claim 1, wherein R^2 is $(C_6$-$C_{16})$ alkyl if m is 0 or -CH=CH- if m is 1.

5. The compound of claim 1, wherein R^3 is $-CH_2CH_2-$.

6. The compound of claim 1, wherein R^4 is $-CH_2-$.

7. The compound of claim 1, wherein R^5 is $-CH_2-$.

8. The compound of claim 1, wherein R^6, R^7 and R^8 are each $-CH_3$.

9. The compound of claim 1, wherein X^1 is S, NHC=O, -NH- or O.

10. The compound of claim 1, wherein X^2 is S, NHC=O or O.

11. The compound of claim 1, wherein X^3 is O or S.

12. The compound of claim 1, wherein E^1 is N_3, S or H.

13. The compound of claim 1, wherein Z^1 is H or S.

14. The compound of claim 1, wherein E^2 is N_3, S or H.

15. The compound of claim 1, wherein Z^2 is H or S.

16. The compound of claim 1, wherein n is 0 and m is 1.

17. The compound of claim 1, wherein n is 1 and m is 0.

18. The compound of claim 1, wherein D^1 is selected from the group consisting of cytosine, guanine, inosine and thymine.

19. The compound of claim 1, wherein D^2 is selected from the group consisting of cytosine, guanine, inosine and thymine.

20. A pharmaceutically acceptable salt of the compound of claim 1.

21. The pharmaceutically acceptable salt of claim 20, wherein said compound is present in an amount effective to inhibit virus replication in a mammal.

22. The compound of claim 1,

wherein,

R^1 is (C_6-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl;

R^2 is (C_4-C_{12}) alkylene;

R^3 is -CH_2CH_2-;

R^5 is -CH_2-;

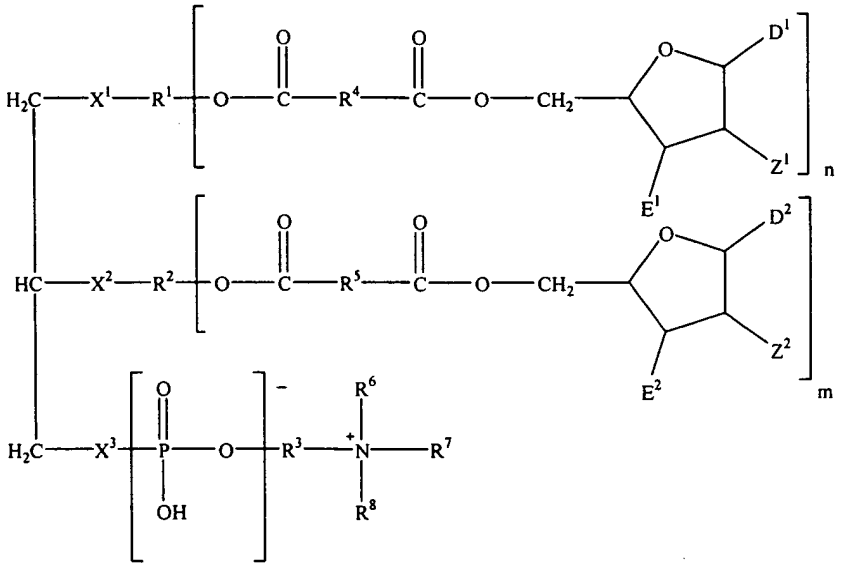
R^6, R^7 and R^8 are each CH_3;

X^1 and X^2 are each independently S, O or NHC=O;

E^2 is H or N_3;

D^2 is selected from the group consisting of thymine, cytosine, guanine and inosine, and wherein each alkyl, branched alkyl, alkylene, alkenyl, alkynyl, thymine, cytosine, guanine, and inosine of R^1, R^2, R^3, R^5, R^6, R^7, R^8, and D^2 can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, (C_1-C_8) alkyl, (C_1-C_8) alkoxy, aryl, and $N(R^a)(R^b)$, wherein R^a and R^b are each independently selected from the group consisting of H and (C_1-C_8) alkyl.

23. A method of treating a virus infection in a mammal, the method comprising administering to said mammal, in an amount effective to treat said infection, a compound having the structure of Formula I:



wherein,

n and m are each independently 0 or 1, but n and m are not both 0;

R^1 is (C_1-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl if n is 0 and (C_1-C_{16}) alkylene, branched alkyl, alkenyl or alkynyl if n is 1;

R^2 is (C_1-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl if m is 0 and (C_1-C_{16}) alkylene, branched alkyl, alkenyl or alkynyl if m is 1;

R^3, R^4 and R^5 are each independently (C_1-C_8) alkylene;

R^6, R^7 and R^8 are each independently (C_1-C_8) alkyl;

X^1 and X^2 are each independently S, O, NHC=O, OC=O or NH;

X^3 is O or S;

E^1 is H, S, halo or N_3;

Z^1 is H, S, or halo; or E^1 and Z^1 together are a covalent bond;

E^2 is H, S, halo, or N_3;

Z^2 is H, S, or halo; or E^2 and Z^2 together are a covalent bond;

D^1 and D^2 are each independently selected from the group consisting of purine, pyrimidine, adenine, thymine, cytosine, guanine, hypoxanthine, inosine, uracil and ring modifications thereof, including O, N, and S substitutions, and

wherein, each alkyl, alkylene, branched alkyl, alkenyl, alkynyl, adenine, thymine, cytosine, guanine, pyrimidine, purine, hypoxanthine, inosine and uracil of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, D^1, and D^2 can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, $(C_1$-$C_8)$ alkyl, $(C_1$-$C_8)$ alkoxy, aryl, and $N(R^a)(R^b)$ wherein R^a and R^b are each independently selected from the group consisting of H and $(C_1$-$C_8)$ alkyl.

24. The method of claim 23, wherein R^1 is $(C_8$-$C_{12})$ alkyl if n is 0 and $-CH_2CH_2-$ if n is 1.

25. The method of claim 23, wherein R^2 is $(C_8$-$C_{12})$ alkyl if m is 0 and $-CH_2CH_2-$ if m is 1.

26. The method of claim 23, wherein R^3 is $-CH_2CH_2-$.

27. The method of claim 23, wherein R^4 is $-CH_2-$.

28. The method of claim 23, wherein R^5 is $-CH_2-$.

29. The method of claim 23, wherein R^6, R^7 and R^8 are each $-CH_3$.

30. The method of claim 23, wherein X^1 is S or O.

31. The method of claim 23, wherein X^2 is S or O.

32. The method of claim 23, wherein X^3 is O.

33. The method of claim 23, wherein E^1 is N_3 or H.

34. The method of claim 23, wherein Z^1 is H.

35. The method of claim 23, wherein E^2 is N_3 or H.

36. The method of claim 23, wherein Z^2 is H.

37. The method of claim 23, wherein n is 0 and m is 1.

38. The method of claim 23, wherein n is 1 and m is 0.

39. The method of claim 23, wherein D^1 is selected from the group consisting of cytosine, guanine, inosine, and thymine.

40. The method of claim 23, wherein D^2 is selected from the group consisting of cytosine, guanine, inosine, and thymine.

41. The method of claim 23, wherein said virus infection is an infection by a virus selected from the group consisting of HIV, hepatitis virus, and a herpes virus.

42. The method of claim 41, wherein said HIV is selected from the group consisting of HIV-1 and HIV-2.

43. The method of claim 41, wherein said hepatitis virus is selected from the group consisting of hepatitis A, hepatitis B, hepatitis C, hepatitis D, and hepatitis E viruses.

44. The method of claim 41, wherein said herpes virus is selected from the group consisting of herpes simplex virus type 1, herpes simplex virus type 2, varicella-zoster

virus, cytomegalovirus, Epstein Barr virus, human herpes virus type 6, human herpes virus type 7, and human herpes virus type 8.

45. The method of claim 23,

wherein

R^1 is $(C_6\text{-}C_{16})$ alkyl, branched alkyl, alkenyl or alkynyl;

R^2 is $(C_4\text{-}C_{12})$ alkylene;

R^3 is $-CH_2CH_2-$;

R^5 is $-CH_2-$;

R^6, R^7 and R^8 are each CH_3;

X^1 and X^2 are each independently S, O or NHC=O;

E^2 is H or N_3;

D^2 is selected from the group consisting of thymine, cytosine, guanine and inosine, and wherein each alkyl, branched alkyl, alkylene, alkenyl, alkynyl, thymine, cytosine, guanine, and inosine of R^1, R^2, R^3, R^5, R^6, R^7, R^8, and D^2 can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, $(C_1\text{-}C_8)$ alkyl, $(C_1\text{-}C_8)$ alkoxy, aryl, and $N(R^a)(R^b)$, wherein R^a and R^b are each independently selected from the group consisting of H and $(C_1\text{-}C_8)$ alkyl.

46. The method of claim 23, wherein a pharmaceutically acceptable salt of said compound is administered to said mammal.

47. The method of claim 23, wherein said mammal is a human.

48. A method of inhibiting virus replication in a cell, the method comprising administering to said cell a compound of claim 1 in an amount effective to inhibit virus replication in said cell.

49. A pharmaceutical composition comprising a compound of claim 1 in combination with a pharmaceutically acceptable carrier.

50. A pharmaceutical composition comprising a compound of claim 22 in combination with a pharmaceutically acceptable carrier.

51. The pharmaceutical composition of claim 49, wherein said compound is present in an amount effective to inhibit virus replication in a mammal.

52. The pharmaceutical composition of claim 50, wherein said compound is present in an amount effective to inhibit virus replication in a mammal.

53. A kit for treatment of a viral infection in a mammal, said kit comprising

a) a composition selected from the group consisting of a compound of claim 1, a pharmaceutically acceptable salt thereof, and a pharmaceutical composition comprising a compound of claim 1, and

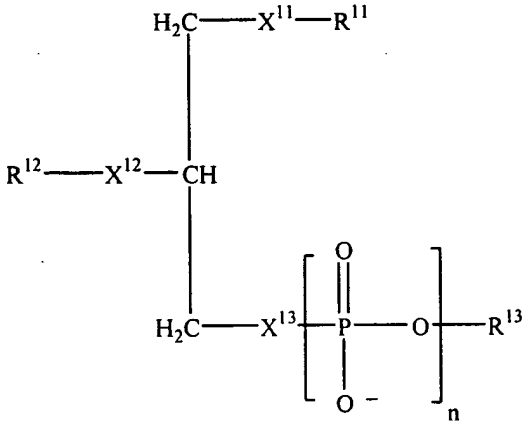
b) an instructional material.

54. A kit for inhibition of virus replication in a cell, said kit comprising

a) a composition selected from the group consisting of a compound of claim 1, a pharmaceutically acceptable salt thereof, and a pharmaceutical composition comprising a compound of claim 1, and

b) an instructional material.

55. A compound having the structure of Formula III:



(III)

wherein,

R^{11} is (C_1-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl;

R^{12} is (C_1-C_{16}) alkyl, branched alkyl, alkenyl or alkynyl;

X^{11} is O, S, or NHC=O;

X^{12} is O, S, or NHC=O;

X^{13} is O or S;

n is 0, 1 or 2, and

R^{13} is a therapeutic agent,

wherein, each alkyl, branched alkyl, alkenyl, alkynyl, adenine, thymine, cytosine, guanine, pyrimidine, purine, hypoxanthine, inosine and uracil of R^{11}, R^{12}, and R^{13} can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, (C_1-C_8) alkyl, (C_1-C_8) alkoxy, aryl, and $N(R^a)(R^b)$ wherein R^a and R^b are each independently selected from the group consisting of H and (C_1-C_8) alkyl, and

wherein, if n is 1 or 2, the compound is a phospholipase C substrate and is not a phospholipase A substrate, and

further wherein, if n is 1 or 2, the compound is converted to an alkyl lipid and a moiety selected from the group consisting of a nucleoside monophosphate and a nucleoside analogue monophosphate intracellularly in a mammal, and is not converted to an alkyl lipid and a moiety selected from the group consisting of a nucleoside monophosphate and a nucleoside analogue monophosphate extracellularly in a mammal.

56. The compound of claim 55,

wherein,

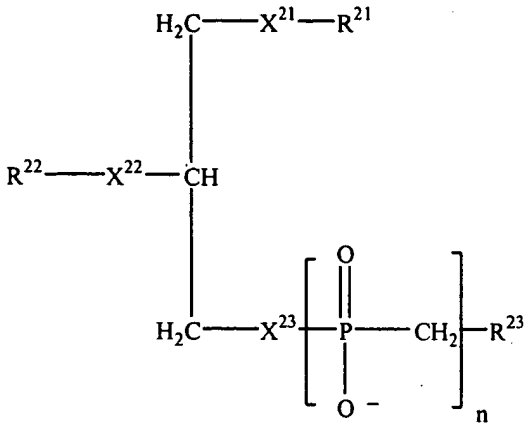
R^{11} is a C_{12} alkyl, branched alkyl, alkenyl or alkynyl;

R^{12} is C_8H_{16} alkyl or branched alkyl;

n = 1,

and R^{13} is an anticancer agent selected from the group consisting of gemcitabine, ara-C, 5-azacytidine, cladribine, fluclarabine, fluorodeoxyuridine, cytosine arabinoside and 6-mercaptopurine, wherein the phosphorus atom of the phosphate moiety is covalently linked in a phosphate ester likage to the oxygen atom of the 5' hydroxyl group of a sugar moiety of R^{13}.

57. A compound having the structure of Formula IV:



(IV)

wherein,

R^{21} is (C_6 to C_{16}) alkyl, branched alkyl, alkenyl, or alkynyl;

R^{22} is (C_1 to C_{12}) alkyl, branched alkyl, alkenyl, or alkynyl;

X^{21} is O, S, or NHC=O;

X^{22} is O, S, or NHC=O;

X^{23} is O or S;

n is 1 or 2;

R^{23} is a therapeutic agent, and

wherein, each alkyl, branched alkyl, alkenyl, alkynyl, adenine, thymine, cytosine, guanine, pyrimidine, purine, hypoxanthine, inosine and uracil of R^{21}, R^{22}, and R^{23} can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, (C_1-C_8) alkyl, (C_1-C_8) alkoxy, aryl, and $N(R^a)(R^b)$ wherein R^a and R^b are each independently selected from the group consisting of H and (C_1-C_8) alkyl.

58. The compound of claim 57,

wherein,

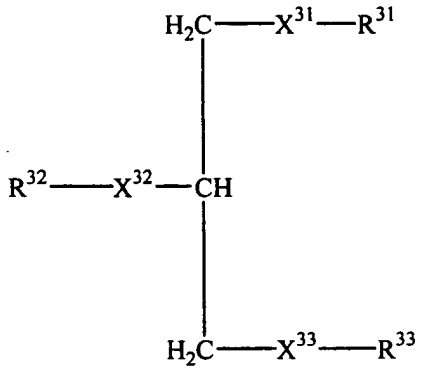
R^{21} is C_{12} alkyl;

R^{22} is C_{10} alkyl;

n = 1, and

R^{23} is an anticancer agent selected from the group consisting of gemcitabine, ara-C, 5-azacytidine, cladribine, fluclarabine, fluorodeoxyuridine, cytosine arabinoside and 6-mercaptopurine, wherein the methylene group of the phosphonate moiety is covalently linked to the oxygen atom of the 5' hydroxyl group of a sugar moiety of R^{23}.

59. A compound having the structure of Formula V:



(V)

wherein,

R^{31} is (C_1 to C_{16}) alkyl, branched alkyl, alkenyl, or alkynyl;

R^{32} is (C_1 to C_{16}) alkyl, branched alkyl, alkenyl, or alkynyl;

X^{31} is O, S, or NHC=O;

X^{32} is O, S, or NHC=O;

X^{33} is –OH, –SH, or amino;

R^{33} is a therapeutic agent, and

wherein, each alkyl, branched alkyl, alkenyl, alkynyl, adenine, thymine, cytosine, guanine, pyrimidine, purine, hypoxanthine, inosine and uracil of R^{31}, R^{32}, and R^{33} can, optionally, be substituted with 1, 2, 3, or 4 substituents independently selected from the group consisting of halo, nitro, trifluoromethyl, (C_1-C_8) alkyl, (C_1-C_8) alkoxy, aryl, and $N(R^a)(R^b)$ wherein R^a and R^b are each independently selected from the group consisting of H and (C_1-C_8) alkyl.

60. The compound of claim 59,

wherein,

R^{31} is (C_6 –C_{16}) alkyl, branched alkyl, alkenyl or alkynyl;

R^{32} is (C_1 –C_8) alkyl, branched alkyl, alkenyl or alkynyl, and

R^{33} is an anticancer agent selected from the group consisting of mitoxanthrone, methotrexate and CPT-11, and is covalently linked via an ester, amido or carbamate linkage to the –SH, OH or amino group of X^{33}.

61. The compound of claim 55, wherein said compound is suspended in a pharmaceutically acceptable carrier and is present in an amount effective to combat a cancer in a mammal.

62. The compound of claim 61, wherein said cancer is a cancer selected from the group consisting of a carcinoma, a sarcoma, a neuroblastoma, a leukemia, a lymphoma and a solid tumor.

63. The compound of claim 55, wherein said compound is present in an amount effective to facilitate delivery of a therapeutic agent to a mammalian cell.

64. The compound of claim 63, wherein said therapeutic agent is an anticancer agent.

65. The compound of claim 63, wherein the cell is in a mammal.

66. The compound of claim 65, wherein the cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

67. The compound of claim 66, wherein the CNS cell is an astrocyte or a glial cell.

68. A pharmaceutically acceptable salt of the compound of claim 55.

69. The pharmaceutically acceptable salt of claim 68, wherein the compound is present in an amount effective to facilitate delivery of a therapeutic agent to a mammalian cell.

70. The pharmaceutically acceptable salt of claim 69, wherein the cell is in a mammal.

71. The pharmaceutically acceptable salt of claim 70, wherein the cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

72. The pharmaceutically acceptable salt of claim 68, wherein said compound is present in an amount effective to combat a cancer in a mammal.

73. A pharmaceutically acceptable salt of the compound of claim 56.

74. The pharmaceutically acceptable salt of claim 73, wherein said compound is present in an amount effective to facilitate delivery of a therapeutic agent to a mammalian cell.

75. The pharmaceutically acceptable salt of claim 74, wherein said therapeutic agent is an anticancer agent.

76. The pharmaceutically acceptable salt of claim 74, wherein said cell is in a mammal.

77. The pharmaceutically acceptable salt of claim 74, wherein said cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

78. The pharmaceutically acceptable salt of claim 68, wherein said compound is present in an amount effective to combat a cancer in a mammal.

79. A drug delivery agent comprising a pharmaceutical composition, said composition comprising a compound of claim 55 or a pharmaceutically acceptable salt thereof, in an amount effective to facilitate delivery of a therapeutic agent to a mammalian cell.

80. The drug delivery agent of claim 79, wherein said therapeutic agent is an anticancer agent.

81. The drug delivery agent of claim 79, wherein said cell is in a mammal.

82. The drug delivery agent of claim 79, wherein said cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

83. A drug delivery agent comprising a pharmaceutical composition, said composition comprising a compound of claim 55 or a pharmaceutically acceptable salt thereof, in an amount effective to combat a cancer in a mammal.

84. The drug delivery agent of claim 83, wherein said cancer is a cancer selected from the group consisting of a carcinoma, a sarcoma, a neuroblastoma, a leukemia, a lymphoma and a solid tumor.

85. A drug delivery agent comprising a pharmaceutical composition, the composition comprising a compound of claim 56 or a pharmaceutically acceptable salt thereof, in an amount effective to facilitate delivery of a therapeutic agent to a mammalian cell.

86. The drug delivery agent of claim 85, wherein the cell is in a mammal.

87. The drug delivery agent of claim 85, wherein said cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

88. A drug delivery agent comprising a pharmaceutical composition, said composition comprising a compound of claim 56 or a pharmaceutically acceptable salt thereof, in an amount effective to combat a cancer in a mammal.

89. The drug delivery agent of claim 88, wherein said cancer is a cancer selected from the group consisting of a carcinoma, a sarcoma, a neuroblastoma, a leukemia, a lymphoma and a solid tumor.

90. A method of facilitating delivery of a therapeutic agent to a mammalian cell, said method comprising administering to said cell a pharmaceutical composition comprising a compound of claim 55 or a pharmaceutically acceptable salt thereof, in an amount effective to facilitate delivery of said therapeutic agent to said cell.

91. The method of claim 90, wherein said therapeutic agent is an anticancer agent.

92. The method of claim 90, wherein said cell is in a mammal.

93. The method of claim 90, wherein the cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

94. A method of facilitating delivery of a therapeutic agent to a cell, said method comprising administering to said cell a pharmaceutical composition comprising a compound of claim 56 or a pharmaceutically acceptable salt thereof, in an amount effective to facilitate delivery of said therapeutic agent to said cell.

95. The method of claim 94, wherein said cell is in a mammal.

96. The method of claim 94, wherein said cell is a cell selected from the group consisting of a CNS cell and a lymphoid cell.

97. A method of combating a cancer in a mammal comprising administering to said mammal a pharmaceutical composition comprising a compound of claim 55 or a pharmaceutically acceptable salt thereof, in an amount effective to combat a cancer in the mammal.

98. The method of claim 97, wherein said cancer is a cancer selected from the group consisting of a carcinoma, a sarcoma, a neuroblastoma, a leukemia, a lymphoma and a solid tumor.

99. A method of treating a disease in a mammal, said method comprising administering to said mammal a pharmaceutical composition comprising a compound of claim 55, or a pharmaceutically acceptable salt thereof, in an amount effective to facilitate delivery of a therapeutic agent to a cell in said mammal, thereby treating said disease.

100. The method of claim 99, wherein said disease is a disease selected from the group consisting of a brain disease, a CNS disease, a lymphatic system disease, a reproductive system disease, a cardiovascular disease, a kidney disease and a liver disease.

101. A kit for combating a cancer in a mammal, said kit comprising

a) a composition selected from the group consisting of a compound of claim 55, a pharmaceutically acceptable salt thereof, and a pharmaceutical composition comprising a compound of claim 55, and

b) an instructional material.

102. A kit for facilitating delivery of a therapeutic agent to a mammalian cell, said kit comprising

a) a composition selected from the group consisting of a compound of claim 55, a pharmaceutically acceptable salt thereof, and a pharmaceutical composition comprising a compound of claim 55, and

b) an instructional material.

103. The kit of claim 102, wherein said therapeutic agent is an anticancer agent.